



Spire STL Pipeline Project

Draft Resource Report 10
Alternatives

FERC Docket No. PF16-9-000

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Public



RESOURCE REPORT 10 - ALTERNATIVES	
SUMMARY OF FILING INFORMATION	
Information	Found in
1. Address the “no action” alternative. (§ 380.12(l)(1)). Discuss the costs and benefits associated with the alternative.	Section 10.2
2. For large projects, address the effect of energy conservation or energy alternatives to the project. (§ 380.12(l)(1))	Section 10.2
3. Identify system alternatives considered during the identification of the project and provide the rationale for rejecting each alternative. (§ 380.12(l)(1)). Discuss the costs and benefits associated with each alternative.	Section 10.3
4. Identify major and minor route alternatives considered to avoid impact on sensitive environmental areas (<i>e.g.</i> , wetlands, parks, or residences) and provide sufficient comparative data to justify the selection of the proposed route. (§ 380.12(l)(2)(ii)). For onshore projects near to offshore areas, be sure to address alternatives using offshore routings.	Section 10.3
5. Identify alternative sites considered for the location of major new aboveground facilities and provide sufficient comparative data to justify the selection of the proposed site. (§ 380.12(l)(2)(ii))	Section 10.5
INFORMATION RECOMMENDED OR OFTEN MISSING	
1. Ensure that project objectives that serve as the basis for evaluating alternatives are consistent with the purpose and need discussion in Resource Report 1.	Section 10.2, Section 10.3, and Section 10.4
2. Identify and Evaluate alternatives identified by stakeholders.	Section 10.4
3. Clearly identify and compare the corresponding segments of route alternatives and route variations to the segments of the proposed route that they would replace if adopted.	Section 10.4



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Acronyms and Abbreviations

CO ₂	carbon dioxide
Dth/d	dekatherms per day
EPA	Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
GIS	geographic information systems
HCA	high consequence area
HDD	horizontal directional drill
LGC	Laclede Gas Company
M&R	metering and regulating
MoGas	MoGas Pipeline, LLC
MP	milepost
Enable MRT	Enable Mississippi River Transmission, LLC
NGPL	Natural Gas Pipeline Company of America, LLC
NHD	National Hydrography Dataset
NWI	National Wetlands Inventory
NRIS	Natural Resource Information System
PHMSA	Pipeline and Hazardous Materials Safety Administration
PPRO	Preliminary Pipeline Route Optimization
Project	Spire STL Pipeline Project
REX	Rockies Express Pipeline LLC
Spire	Spire STL Pipeline LLC
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service



Alternatives

Consistent with the National Environmental Policy Act of 1969 and the Federal Energy Regulatory Commission’s (“FERC”) regulations, this resource report describes the alternatives that were considered during development of Spire STL Pipeline LLC’s (“Spire”) proposed Spire STL Pipeline Project (“Project”), including the no action alternative, energy alternatives, system alternatives, pipeline route alternatives, minor route variations, and aboveground facility site alternatives, and the resulting decisions that led to selection of the proposed Project scope.

10.1 Introduction

Spire undertook extensive alternative routing analyses for the Project. The primary objective in performing these analyses was to develop a viable Project that could accomplish Spire’s objective to provide 400,000 dekatherms per day (“Dth/d”) of additional natural gas transportation capacity to the St. Louis metropolitan area, eastern Missouri, and southwestern Illinois, through transportation paths and from gas supply areas distinct from the areas historically relied upon to serve the greater St. Louis area. Spire evaluated alternatives based on environmental considerations, population densities, and construction safety and engineering feasibility considerations.

10.2 No-Action Alternative

The Project is designed to provide approximately 400,000 Dth/d of year-round transportation service from an interconnect with Rockies Express Pipeline, LLC (“REX”) in Scott County, Illinois to markets in the St. Louis metropolitan area, eastern Missouri, and southwestern Illinois. Its purpose, first and foremost, is to provide additional firm pipeline capacity and associated natural gas supply from additional supply basins to homes and businesses in the St. Louis metropolitan area and surrounding counties. Moreover, the Project will enhance reliability and supply security, will reduce reliance upon older and less favorable natural gas pipelines and propane peak-shaving infrastructure, and help meet the strategic supply planning and reliability enhancement objectives of the Foundation Shipper, Laclede Gas Company (“LGC”).

Under the “no-action” alternative, the temporary and permanent impacts associated with construction and operation of the proposed new pipeline would be avoided. However, the needs that the Project is designed to fulfill would also not be met. In particular, the St. Louis region and surrounding counties in Missouri and southwest Illinois would not have access to gas supplies sourced from new supply basins, and would be left with only their historical gas supply options.

The historical supply areas are projected to decline, in contrast to projected increases from newer gas supply basins in other regions. One of the consequence of such supply declines are likely to be increased prices.

In addition, if the Project were not constructed, the St. Louis region would not obtain the new physical natural gas transportation path reinforcement thereby reducing reliability, and would continue to experience increased risk of service interruption given its disproportionate dependence on a single incumbent pipeline system, Enable MRT.



The fact that the incumbent pipeline system traverses an acknowledged area of increased seismic activity magnifies the risk associated with such lack of transportation path diversity. Additionally, without the Project the Foundation Shipper, LGC, would have lost a peak day supply option and would need to consider whether any viable alternatives exist to address its current dependence on a propane peak-shaving facility that does not meet its current system's operational and reliability needs.

Thus, if the Project were not pursued, the Foundation Shipper and similarly situated customers in eastern Missouri and southwest Illinois would need to explore different pipeline construction projects or risk negative price and reliability issues. Those projects would carry their own environmental effects, as discussed in the systems alternative section below.

In addition to direct impacts on gas supply competitive options and resource security and reliability, there would be no increase in firm transportation capacity into the region, and thus the anticipated benefits of providing access to incremental gas supplies to support market growth, particularly in the industrial and electric generation sectors, would not be met. This has both economic consequences and negative environmental effects, where additional gas supply would not be available to displace coal and other fossil fuels that have greater emissions of greenhouse gases.

10.2.1 Energy Conservation

The goal of reducing energy usage is an important alternative to include in the portfolio of strategies to deal with growth in energy demand. Energy conservation has been embedded in federal and state regulatory policy in recent years. The Project's Foundation Shipper, LGC, to which the majority of the Project's capacity is dedicated, has a number of energy efficiency programs for residential, commercial, and industrial customers. All of these programs are aimed at assisting customers to use natural gas as efficiently as possible, both as a means of achieving savings for the customer as well as an environmentally friendly way to conserve on the use of a natural resource. These programs, while effective, are not a viable alternative for the Project for a number of reasons:

First, the Project is not premised primarily on the need to meet existing or future load demands but also on the need to obtain additional diversity in the pipeline capacity and gas supply sources serving the St. Louis market.

Second, while energy efficiency programs are important, much of the efficiency gains have already been achieved and the remaining overall impact on load growth is limited, and not a significant enough factor to reduce or eliminate the need for the Project.

Third, by delivering natural gas through a new pipeline facility that will have less potential for fugitive methane emissions, the Project will complement the environmental and economic goals of energy efficiency programs, rather than compete with them.

For all of these reasons, energy conservation efforts, while important and ongoing, would not be a viable or practicable alternative to the planned new pipeline facility.



10.2.2 Alternative Energy Sources

The use of alternative sources of energy in place of the natural gas transportation service to be provided by the Project would not meet the Project's purpose and need. As described above, this Project is fundamentally intended to enhance the long-term supply security and cost competitiveness of natural gas to meet the needs of existing residential, commercial, and industrial natural gas customers of the Foundation Shipper, LGC. Those natural gas customers' needs could not be met with alternative fuels.

The Project's support of increased natural gas supply to meet new industrial and electric generation demand is intended to displace alternative fuels such as coal that emit more carbon dioxide ("CO₂") per unit of usable energy produced than natural gas. Thus, foregoing this additional natural gas infrastructure would have the harmful environmental effect of undermining the reduction of CO₂ emissions through conversion to natural gas. This could, in turn, challenge the region's ability to meet Environmental Protection Agency ("EPA") and other environmental goals and standards.

Moreover, it is well recognized that renewable electricity generation, such as wind and solar power, require flexible and complementary electric power production from facilities such as natural gas fired generators in order to address their intermittency (Popp et al., 2016). To the extent the Project would be used to support new gas-fired generation, the no-action alternative could negatively affect the development of alternative, renewable energy sources.

10.3 System Alternatives

System alternatives are alternatives to the proposed action that would make use of other existing, modified, or proposed natural gas pipeline systems or compression to meet the stated purpose and need for the proposed Project. System alternatives involve the transportation of the equivalent amount of incremental natural gas volumes by the use or expansion of existing pipeline systems or by the construction and operation of other new pipeline systems.

To be a viable system alternative for consideration below, a potential system needs to be capable of transporting 350,000 Dth/d from the REX system to a point near the LGC underground storage facility in St. Louis County, Missouri. Spire does not have existing transmission infrastructure, therefore alternatives are limited. Currently, unsubscribed capacity on existing pipeline systems into the St. Louis region is limited to approximately 20,000 to 30,000 Dth/d as a combined total on the systems of Enable Mississippi River Transmission, LLC ("Enable MRT") and MoGas Pipeline, LLC ("MoGas"). Thus, there is no existing system alternative that could meet the purpose and need of the Project and any system alternative would require the construction of substantial modified or additional pipeline facilities. Such modifications or additions would result in environmental impacts that would in all likelihood be similar to, and potentially greater than, those associated with construction of the proposed Project.



10.3.1 Natural Gas Pipeline Company of America, LLC

Natural Gas Pipeline Company of America, LLC's ("NGPL") Gulf Coast line runs from South Texas to Chicago, Illinois with a spur running east-to-west toward St. Louis and terminating near Glen Carbon, Illinois. The NGPL system does not currently deliver gas directly into the St. Louis, Missouri region.

To meet the needs of Spire's shippers, NGPL would need to expand its existing system in multiple respects in order to provide firm service that would replicate the service proposed by the Project. First, NGPL would need to construct greenfield facilities extending its existing east-west line in Illinois in order to make deliveries to the St. Louis region. Second, Spire understands that NGPL would need to add compression to expand that existing east-west line to meet the volume needs of Spire's shipper(s). The addition of compression would have impacts on air quality that are not presented by the Project as proposed. Third, Spire's shipper(s) would need to contract for firm transportation service on the NGPL Gulf Coast Main Line in order to receive gas from NGPL's interconnection with REX for delivery to the St. Louis region. An incremental 350-400,000 Dth/d of available, unsubscribed, north-to-south firm capacity on NGPL does not presently exist and therefore an expansion of that mainline pipeline system would need to be undertaken, with consequent environmental and cost effects.

NGPL is currently seeking to expand its system in a southbound direction. In the "Gulf Coast Expansion Project" certificate application pending in Docket No. CP16-488-000,¹ NGPL has proposed to expand its mainline system to serve growing industrial markets along the Gulf Coast. The project, which is fully subscribed under long-term customer contracts, is designed to transport 460,000 Dth/d of firm transportation service from NGPL's interstate pipeline interconnects with REX in Illinois and other pipelines in Arkansas, Oklahoma, and Texas to points south on NGPL's pipeline system. It uses both existing capacity and new expansion capacity of 240,000 Dth/d created through the construction of new and upgraded compression and other ancillary facilities. In May 2016, NGPL proposed a second southbound expansion, and the indicative rates advertised in NGPL's solicitation of interest were \$0.40 Dth/d and \$0.45 Dth/d.² Based on these illustrative upstream capacity charges (which do not include the additional costs that would be associated with greenfield and expanded capacity in Illinois), an NGPL system alternative was not economically viable for the Project's market and therefore deemed not a reasonable alternative.

10.3.2 MoGas Pipeline, LLC

The MoGas system runs from Curryville, Missouri south toward the St. Louis region, with branches running southwest toward Rolla, Missouri and east toward Alton, Illinois. The total estimated peak day deliverable capacity most recently reported by MoGas to FERC is 94,922 Dth/d.³ Thus, MoGas's current system is substantially smaller

¹ Abbreviated Application of Natural Gas Pipeline Company of America LLC for a Certificate of Public Convenience and Necessity to Construct and Operate Facilities for Authorization to Abandon Facilities, FERC Docket No. CP16-488-000 (filed August 1, 2016).

² Natural Gas Pipeline Company of America LLC, Gulf Coast Southbound Expansion Project Phase 2, Notice of Nonbinding Solicitation of Interest (May 10, 2016). See http://www.kindermorgan.com/content/docs/NGPL_GCML_posting.pdf.

³ MoGas Pipeline LLC, 18 C.F.R. § 284.13(d)(2) 2015 Annual Peak Day Capacity Report, filed at FERC on February 22, 2016.



than the Project and could not meet the needs of Spire’s shipper(s) even if that pipeline system was not already substantially subscribed to other customers (which it is).⁴

Moreover, no expansion of the current MoGas pipeline system could accommodate the needs of Spire’s market. Instead, an entire new pipeline system more than 80 miles in length would need to be constructed along the MoGas pipeline corridor. Such a new pipeline system would encompass the entire MoGas mainline segment as well as the entire branch of MoGas running to West Alton, Missouri. Though collocation of such a new pipeline with the existing MoGas system might result in some benefits, the significantly greater length would also have greater environmental effects than the Project. The substantially higher rates likely to be associated with this system alternative also made it not viable for Spire’s shipper(s) and therefore not a reasonably practicable alternative.

10.4 Route Alternatives

Spire has evaluated many route alternatives for the Project as presented below. Route alternatives are still under evaluation and additional information may be provided in the FERC application as necessary. For the purpose of this resource report, Spire has analyzed major and minor route alternatives and minor route deviations. Major alternatives are those which significantly deviate from the Proposed Route; minor route alternatives are those which deviate from the Proposed Route but are still located within the same general area. Minor route deviations consist of those minor route adjustments which are incorporated into the Project route in order to avoid specific features (e.g. structures, topography, or sensitive resources).

Spire utilized a Preliminary Pipeline Route Optimization (“PPRO”) tool to identify route alternatives during the planning stages of the Project. The PPRO tool is a proprietary geographic information systems (“GIS”) enabled desktop pipeline routing tool and pipeline routing database that can generate multiple preliminary pipeline routes based on engineering, construction, environmental, land, and socioeconomic factors. PPRO provides impact analysis reporting and crossing reports such as slope, landownership, structures, wetlands, waterbodies, roads, and railroads. Route alternatives identified and considered during the Project planning to date are described below.

10.4.1 Major Route Alternatives

Two major route alternatives were considered for the 24-inch pipeline portion of the Project, as described in detail below. Mapping included in Appendix 10-A shows the major route alternatives considered, including Spire’s Proposed Route. An environmental comparison table based on publically available desktop data is provided as Table 10.4-1.

⁴ See MoGas Pipeline LLC, Index of Customers, <http://www.gasnom.com/ip/mogas/>.



Table 10.4-1. Environmental Comparison of Major Route Alternatives

Environmental Factor¹	Proposed Route with Line 880 Modifications	Illinois Major Route Alternative	Missouri Major Route Alternative with Line 880 Modifications
Total Length			
Greenfield Pipeline (mile)	58	66	78
Existing Pipeline (mile)	7	0	7
Type of Right-of-Way			
Adjacent to Existing Pipeline Right-of-Way (mile)	2.3	5.7	7.5
Adjacent to Other Existing Right-of-Way/Corridors (mile)	12.2	15.0	25.8
Right-of-Way Requirements			
Construction Right-of-Way and ATWS (acre) ²	628.8	718.2	865.1
Permanent Easement (acre)	351.1	399.0	477.7
Compression Requirements (acre)	0.0	15.0	30.0
Wetlands			
Forested (PFO) (mile)	0.3	0.7	1.6
Scrub-Shrub (PSS) (mile)	0	< 0.1	0.1
Total Wetland Impacts (PFO, PSS, PEM, PUB) (acre)	3.8	9.4	32.7
Wetland Complexes (number)	6	7	9
Waterbodies			
Total Perennial Crossed [National Hydrography Dataset (NHD) Flowline Data] (number)	8	12	6
Major Crossings (more than 100 feet) (number)	3	3	3
Designated Natural and Scenic Rivers (number)	0	0	0
Ponds/lakes (number)	3	1	16
Federally Listed Endangered or Threatened Species			
Critical Habitat (number)	0	0	0
Cultural Resources			
NRIS Cultural Site (number)	0	0	0
Land Use			
Barren (mile)	0.1	0	< 0.1
Developed (mile)	4.7	5.6	4.2
Forest (mile)	2.5	5.6	10.2
Herbaceous (mile)	0	0.1	0.8
Planted/Cultivated (mile)	50.3	52.1	61.6
Shrubland (mile)	0	0	0.2



Table 10.4-1. Environmental Comparison of Major Route Alternatives (Continued)

Environmental Factor ¹	Proposed Route with Line 880 Modifications	Illinois Major Route Alternative	Missouri Major Route Alternative with Line 880 Modifications
Land Use (continued)			
Water (mile)	0.9	0.7	0.5
Wetlands (mile)	0.69	1.73	1.99
Residences and Other Structures			
Within 50 Feet of Construction Work Area (number)	20	7	42
Land Ownership			
Conservation Easement (mile)	0	0	2.7
Protective Management Area - Land, Lake or River (mile)	0.5	0	1.9
USACE-owned Land ³ (mile)	0.2	1.3	0

Notes:

- ¹ Data is based on desktop analysis.
- ² For the alternative routes, the assumed construction right-of-way is 115 feet wide, and the assumed permanent easement is 50 feet wide.
- ³ Mapping was provided by USACE St. Louis District and digitized into a GIS data layer for areas within the vicinity of the Proposed Route. This may not be inclusive of all lands owned by the USACE. This area overlaps with the area identified as the Mississippi River Conservation Area.

10.4.1.1 Illinois Route

The Illinois Route was developed to provide alternative crossings of the Mississippi River. The Illinois Route originates at REX in Morgan County, Illinois, and travels south through Macoupin and Madison Counties, Illinois, before crossing the Mississippi River and terminating at Enable MRT in St. Louis County, Missouri. The total length of pipeline would be approximately 66 miles. Of this, approximately 21 percent of the route would collocate with existing pipeline, powerline, and road or railroad right-of-ways. This major route alternative would avoid crossing the Missouri River and its associated levee, but would cross federal lands owned by the United States Army Corps of Engineers (“USACE”) on the east side of the Mississippi River. There is also a crossing of a canal that serves vessels utilizing the Mississippi River for shipping. It would be likely that one horizontal directional drill (“HDD”) would be required for the Mississippi River and a second HDD would be required to cross the canal, since traversing both the river and the canal may not be technically feasible in a single drill.

Under this alternative, the modifications to existing Line 880 would no longer be required to transport interstate natural gas. Thus, the proposed modifications to Line 880 would not be part of this Project. However, Line 880 would still be utilized in a distribution system, and would eventually need to be modified as part of the distribution system’s integrity management program. It is also anticipated that approximately 3,300 horsepower of compression would be needed on the Illinois Route in order to flow the gas to the northern end of Line 880, which



connects to a storage field for the distribution company's use. An approximately 15-acre site would be anticipated for construction of the compression facility, with approximately ten acres maintained for operations.

The Illinois Route is approximately eight miles longer than the 24-inch pipeline portion of the Proposed Route, and would therefore be expected to result in slightly greater impacts as a result of construction and operation. In addition, the Illinois Route impacts a larger proportion of highly populated areas and developed areas, including more medium intensity and high intensity areas than the 24-inch pipeline portion of the Proposed Route. Based on United States Fish and Wildlife Service ("USFWS") National Wetlands Inventory ("NWI") data, the Illinois Route would be expected to cross 0.7-mile forested/shrub wetlands and seven wetland complexes. While this is comparable to the number of crossings that would be expected on the Proposed Route, the total mileage of forested/shrub wetlands crossed would be approximately 0.4-mile greater for the Illinois Route. As it would require additional compression, the Illinois Route would result in an increase in air emissions during operation.

10.4.1.2 Missouri Route

The Missouri Route originates at REX, west of the Mississippi River in Pike County, Missouri, and travels southeast through Lincoln and St. Charles Counties, Missouri, before terminating at the existing Line 880 in St. Louis County, Missouri. The total length of greenfield pipeline would be approximately 78 miles. Of this, approximately 43 percent of the route would collocate with existing pipeline, powerline, and road or railroad right-of-ways. This major route alternative would eliminate the need for a crossing at the Mississippi River, and would include one HDD crossing of the Missouri River and its associated levee. As this alternative terminates at Line 880, the existing seven-mile 20-inch pipeline would still require modifications to support the Project. In addition, compression would be needed on this alternative to achieve the necessary delivery pressures on Line 880, which would result in additional permanent impacts for the construction of facility compressor station. An approximately 30-acre site would be anticipated for the compression facility, with approximately 20 acres maintained for operations.

The greenfield portion of the Missouri Route is approximately 20 miles longer than the 24-inch pipeline portion of the Proposed Route, and would therefore be expected to result in greater impacts during construction and operation, particularly in forested areas. Based on review of aerial mapping, the areas crossed by the Missouri Route, would cross significantly more Pipeline and Hazardous Materials Safety Administration ("PHMSA") Ecological High Consequence Areas ("HCAs") than the Proposed Route. Based on USFWS NWI data, the Missouri Route would be expected to cross 1.7 miles of freshwater forested/shrub wetlands and nine wetland complexes, which is greater than the other alternatives considered. As it would require additional compression, the Missouri Route would result in an increase in air emissions during operation.

10.4.1.3 Proposed Route

The Proposed Route originates at REX in Scott County, Illinois, and travels south through Greene and Jersey Counties, Illinois, before crossing the Mississippi River and extending east in St. Charles County, Missouri. The route then crosses the Missouri River and ties into the existing Line 880 in St. Louis County, Missouri. The total length of greenfield 24-inch pipeline would be approximately 58 miles, along with utilization of Line 880, which consists of approximately seven miles of existing pipeline. Under the Proposed Route, Spire would need to acquire and modify the existing Line 880 to deliver gas to MRT. The proposed 24-inch pipeline portion of the Proposed



Route would be colocated with existing pipeline, powerline, road or railroad corridors for approximately 25 percent of the route.

The Mississippi and Missouri Rivers would be crossed via two HDDs. The HDD of the Mississippi River would also cross federal lands owned by the USACE on the west side of the Mississippi River. This route would also include one major crossing (greater than 100 feet) at Macoupin Creek, which would be open-cut. Based on USFWS NWI data, the Proposed Route would be expected to cross 0.3-mile of freshwater forested/shrub wetlands and six wetland complexes.

Overall, the Proposed Route is expected to have fewer environmental impacts due to the shorter length and smaller construction footprint of greenfield pipeline. Also, no additional compression is required for the Proposed Route, which avoids an increase in emissions and impacts on air quality during operation of the Project. The Proposed Route has the least impact among the alternative routes to forests and forested/shrub wetlands. The proposed 24-inch pipeline would affect less residences than the Illinois Route. Line 880, of the Proposed Route, increases the residences and structures count. However, Line 880 is existing, and periodic maintenance activities occur presently. No new permanent impacts to residences are anticipated. For these reasons, the Proposed Route is the preferred route which meets the purpose and need of the Project, while minimizing environmental impact.

10.4.2 Minor Route Alternatives

Three minor alternatives were considered for the 24-inch pipeline portion of the Project, as described in detail below. A table showing a quantitative comparison of the minor alternatives and the corresponding segment of the Proposed Route is provided in Table 10.4-2. A map of the minor route alternatives is included in Appendix 10-B.

10.4.2.1 Minor Alternative 1

Minor Alternative 1 is a route variation considered between approximate milepost (“MP”) 0.0 and MP 2.2 in Scott County, Illinois. This variation would move the interconnect with REX west of the Proposed Route. This alternative is not preferred because it would cross one freshwater pond and impact approximately 0.4-mile of additional deciduous forest versus the Proposed Route. In addition, this alternative does not colocate with existing rights-of-way, while approximately five percent of the Proposed Route colocates with existing powerline or road right-of-way. Therefore, this alternative was not incorporated into the Proposed Route.

10.4.2.2 Minor Alternative 2

Minor Alternative 2 is a route variation considered between approximate MP 0.0 and MP 7.4 in Scott and Greene Counties, Illinois. This variation would move the interconnect with REX east of the Proposed Route. The route would increase the overall length by approximately one-mile. Minor Alternative 2 would reduce impacts to deciduous forests by approximately one-third of a mile and reduce the crossing count for freshwater forested/shrub wetland by one. However due to the increase length of the route, the total construction impacts would be increased by approximately 10 acres. This alternative also includes colocation with existing right-of-ways along 20 percent of the route, whereas the Proposed Route is colocated for 30 percent of the route. Therefore, this alternative was not incorporated into the Proposed Route.



Table 10.4-2. Environmental Comparison of Minor Route Alternatives

Environmental Factor	Alternative at MP 0.0 to MP 2.2		Alternative at MP 0.0 to MP 7.4		Alternative at MP 0.0 to MP13.0	
	Proposed Route	Minor Alternative 1	Proposed Route	Minor Alternative 2	Proposed Route	Minor Alternative 3
Total Length (miles)	2.15	2.06	7.35	8.49	13	13.22
Type of Right-of-Way						
Adjacent to Existing Pipeline Right-of-Way (mile)	0.0	0.0	0.0	0.0	0.00	0.0
Adjacent to Other Existing Right-of-Way/Corridors (mile)	0.1	0.0	2.2	1.7	5.3	2.0
Right-of-Way Requirements						
Construction Right-of-Way (acre)	22.92	22.65	78.99	92.75	140.42	144.34
Permanent Easement (acre)	12.77	12.55	44.24	51.49	78.44	80.16
Wetlands						
Forested (PFO) (mile)	0	0	0.03	0	0.03	0
Scrub-Shrub (PSS) (mile)	0	0	0	0	0	0
Total Wetland Impacts (PFO, PSS, PEM, PUB) (acre)	0	0	0.28	0	0.28	0.27
Wetland Complexes (number)	0	0	1	0	1	1
Waterbodies						
Total Perennial Crossed (NHD Flowline Data) (number)	0	0	3	0	4	2
Major River Crossings (more than 100 feet) (number)	0	0	0	0	0	0
Designated Natural and Scenic Rivers (number)	0	0	0	0	0	0
Ponds/Lakes (number)	0	1	0	0	0	1
Federally Listed Endangered or Threatened Species						
Critical Habitat (number)	0	0	0	0	0	0
Cultural Resources						
NRIS Cultural Site (number)	0	0	0	0	0	0
Land use						
Developed (mile)	0.11	0.17	1.08	0.47	1.2	0.6
Forest (mile)	0.04	0.45	0.87	0.55	0.9	0.78
Planted/Cultivated (mile)	2.01	1.45	5.46	7.51	10.97	11.93
Residences and Other Structures						
Within 50 Feet of Construction Work Area (number)	0	1	1	0	1	0
Land Ownership						
Conservation Easement (mile)	0	0	0	0	0	0
Protective Management Area - Land, Lake or River (mile)	0	0	0	0	0	0
USACE-owned Land ³ (mile)	0	0	0	0	0	0



10.4.2.3 Minor Alternative 3

Minor Alternative 3 is a route variation considered between approximate MP 0.0 and MP 13.0 in Scott and Greene Counties, Illinois. This variation would move the interconnect with REX further east of the Proposed Route and pass to the east of White Hall, Illinois. The length of the pipeline would increase by approximately 0.2-mile. It crosses two additional perennial waterbodies and a fresh water pond, and also includes two additional railroad crossings. The amount of forested/shrub wetland is reduced by one. Minor Alternative 3 is located in closer proximity to the residential areas of White Hall and Roodhouse, Illinois. Approximately 15 percent of this alternative is colocated with existing right-of-ways, whereas the proposed route is colocated for approximately 41 percent of its length. This alternative would potentially be affected by the future plans to improve the US 67 corridor, as a bypass is proposed to the east of White Hall and Roodhouse, Illinois. This alternative was not incorporated into the Proposed Route because of this potential future conflict.

10.4.3 Minor Route Deviations

A minor route deviation would include minor adjustments to the Proposed Route to avoid minor issues such as topographic and man-made features. Because route deviations are considered to resolve localized resource issues (e.g., wetlands, residence, cultural resource sites), they are normally much shorter than major or minor route alternatives.

Spire will continue to review its route for engineering constraints and make necessary minor route deviations as needed. Likewise, if minor route deviations are suggested by landowners or regulatory agencies, Spire will consider these requests as the Proposed Route is further refined. Evaluation of requested deviations will be ongoing and tracked. Descriptions of approved deviations are provided below. As Spire identifies new minor route deviations, details will be provided in the FERC application. Maps of the minor route deviations are provided in Appendix 10-C.

10.4.3.1 Deviation MP 0.0-1.0

Spire has adjusted the pipeline route at this location for constructability. The deviation shifts the 24-inch pipeline east up to 660 feet, and increases the length of pipe by approximately 360 feet. The deviation allows for easier crossings of existing pipelines, and creates a perpendicular crossing at Ansley Glasgow Road. There is no net change to the number of NHD streams or NWI wetlands crossed by the pipeline.

10.4.3.2 Deviation MP 13.3-16.1

Spire has adjusted the pipeline route at this location for constructability. The deviation shifts the 24-inch pipeline west up to 1,000 feet, and decreases the length of the pipeline by approximately 85 feet. The previous route was constrained by proximity to a pond, US 67, and a parallel powerline. The deviation alleviates these workspace constraints, and moves the 24-inch pipeline away from planned future improvements to the US 67 corridor, described in Resource Report 1. There is no net change to the number of NHD streams or NWI wetlands crossed by the pipeline.



10.4.3.3 Deviation MP 17.8-22.1

Spire has adjusted the pipeline route at this location to avoid future conflicts with the planned future improvements to the US 67 corridor, which is proposed to bypass to the west of Carrollton, Illinois, in close proximity to the previous route. The deviation shifts the 24-inch pipeline west up to 3,065 feet, and increases the length of pipe by approximately 2,030 feet. There is no net change to the number of NHD streams or NWI wetlands crossed by the pipeline.

10.4.3.4 Deviation MP 34.7-34.9

Spire has adjusted the pipeline route at this location for [redacted]. The deviation shifts the 24-inch pipeline west up to 335 feet, and increases the length of pipe by approximately 195 feet. The previous route crossed a stream at a location with high banks. The deviation allows for a better crossing in an area with lower stream banks. There is no net change to the number of NHD streams or NWI wetlands crossed by the pipeline.

10.4.3.5 Deviation MP 42.1-43.4

Spire has adjusted the pipeline route at this location for [redacted]. The deviation shifts the 24-inch pipeline west up to 1,100 feet, and increases the length of pipe by approximately 25 feet. This deviation avoids two road crossings and powerlines by staying west of Elsay Road. Several NHD streams were located adjacent to the previous route, and these streams will be avoided with the deviation. There is no net change to the number of NHD streams or NWI wetlands crossed by the pipeline.

10.5 Alternative Metering and Regulating Sites

No major aboveground facilities are proposed as part of this Project. The locations of the proposed metering and regulating stations are largely driven by the terminus of each pipeline. Based on landowner feedback and/or civil survey of the proposed site locations, no alternatives are considered at this time.

10.6 References

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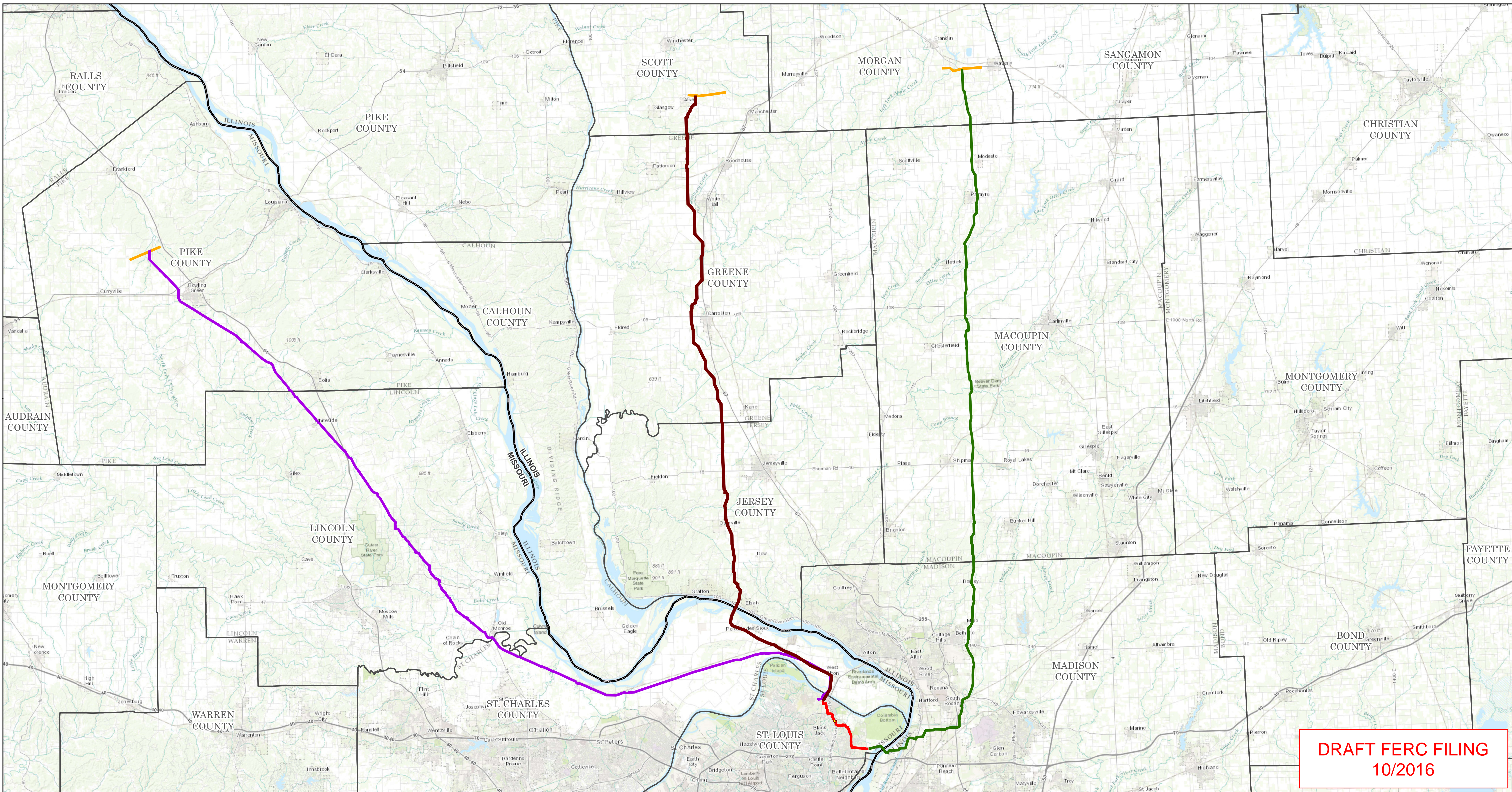
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APPENDIX 10-A
Major Route Alternatives Map



**DRAFT FERC FILING
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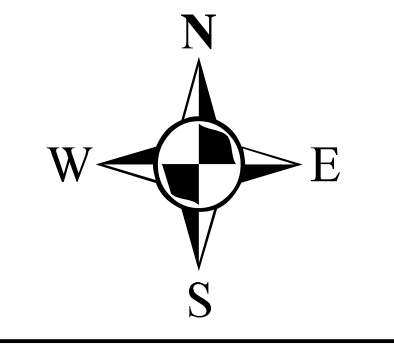
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- EXISTING LINE 880 20-INCH DIAMETER PIPELINE
- LINE 880 20-INCH DIAMETER RELOCATION
- REX CENTERLINE LOCATION
- ILLINOIS ROUTE
- MISSOURI ROUTE
- COUNTY BOUNDARY
- STATE BOUNDARY

SPIRE STL PIPELINE

MAJOR ROUTE ALTERNATIVES

PROPOSED 24-INCH DIAMETER PIPELINE

SCOTT, GREENE, JERSEY, MORGAN, MACOUPIN, & MADISON COUNTIES, ILLINOIS
AND PIKE, LINCOLN, ST. CHARLES, & ST. LOUIS COUNTIES, MISSOURI



ABSOLUTE SCALE:
1:240,000

REFERENCE SCALE:
1 IN = 20,000 feet

PREPARED FOR
Spire STL Pipeline

PREPARED BY
M M
MOTT MACDONALD

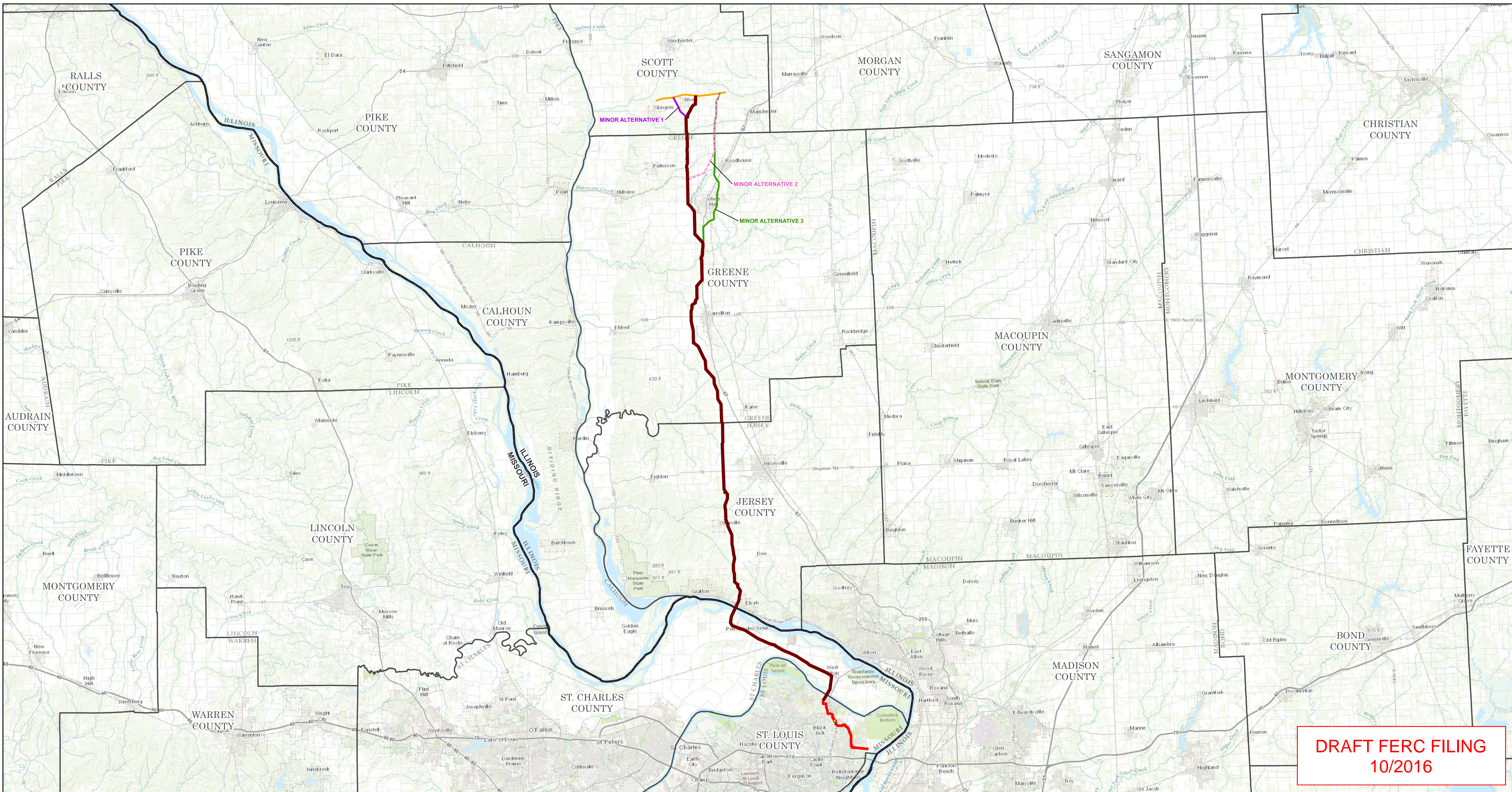
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APPROVED BY:	JW 10/19/2016
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MAPS COMPILED UTILIZING ESRI TOPOGRAPHIC BASEMAP.





APPENDIX 10-B
Minor Route Alternatives Maps



- PROPOSED 24-INCH DIAMETER PIPELINE
- LINE 880 20-INCH DIAMETER RELOCATION
- EXISTING LINE 80 20-INCH DIAMETER PIPELINE
- MINOR ALTERNATIVE 1
- - - MINOR ALTERNATIVE 2
- MINOR ALTERNATIVE 3
- REX CENTERLINE LOCATION
- COUNTY BOUNDARY
- STATE BOUNDARY

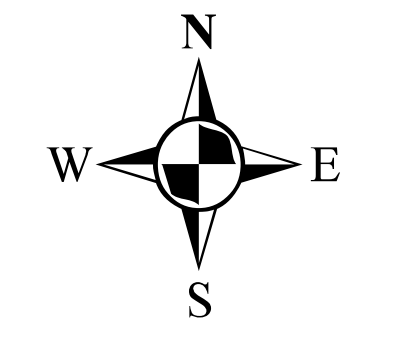
MAPS COMPILED UTILIZING ESRI TOPOGRAPHIC BASEMAP.

SPIRE STL PIPELINE

MINOR ROUTE ALTERNATIVES

PROPOSED 24-INCH DIAMETER PIPELINE

SCOTT, GREENE, & JERSEY COUNTIES, ILLINOIS
AND ST. CHARLES & ST. LOUIS COUNTIES, MISSOURI



ABSOLUTE SCALE:
1:240,000

REFERENCE SCALE:
1 IN = 20,000 feet

PREPARED FOR
Spire STL Pipeline

PREPARED BY
M M
MOTT MACDONALD

DRAWN BY:	EAP 10/19/2016
CHECKED BY:	NDK 10/19/2016
ENG. APPROVAL:	DG 10/19/2016
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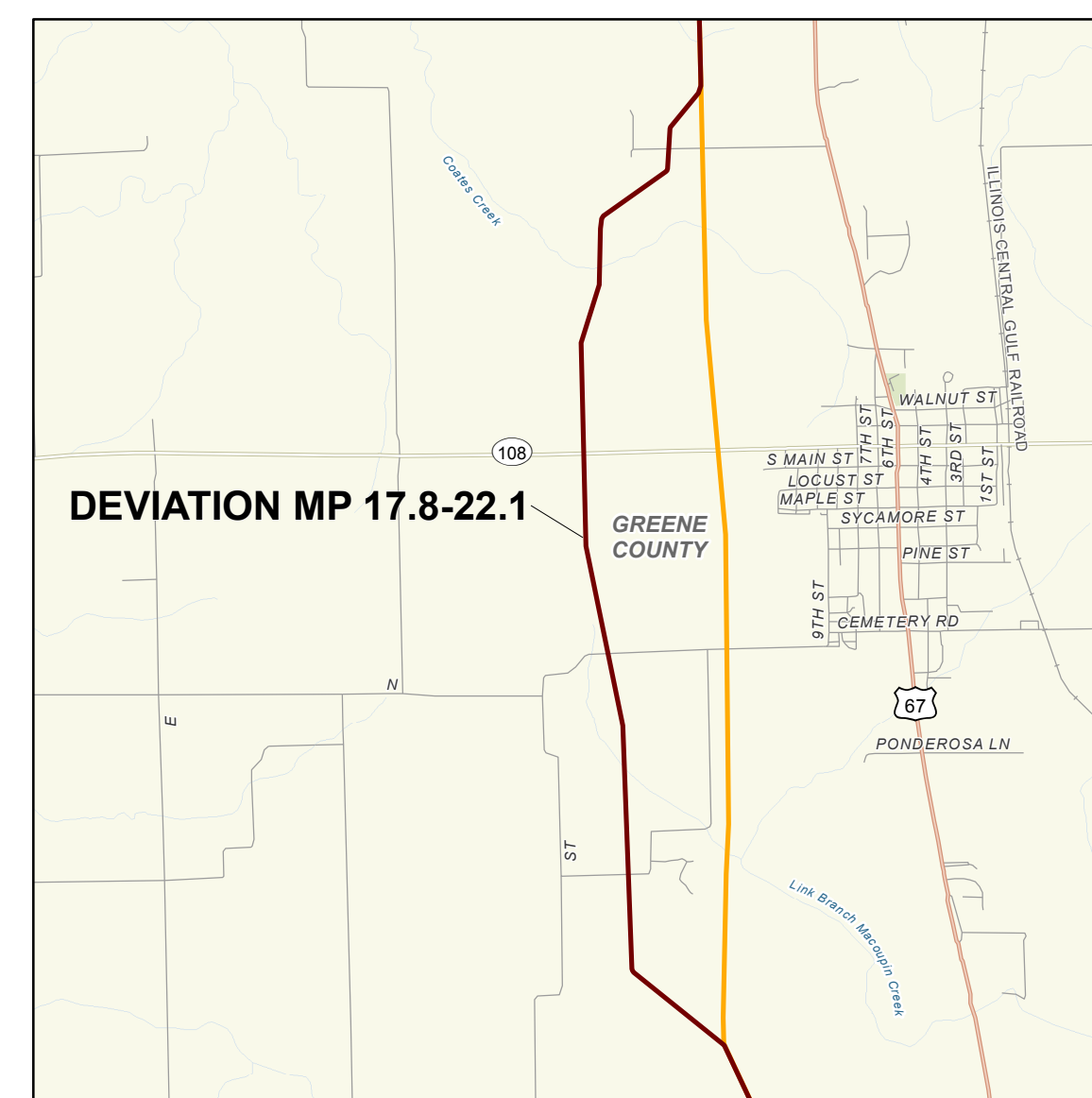
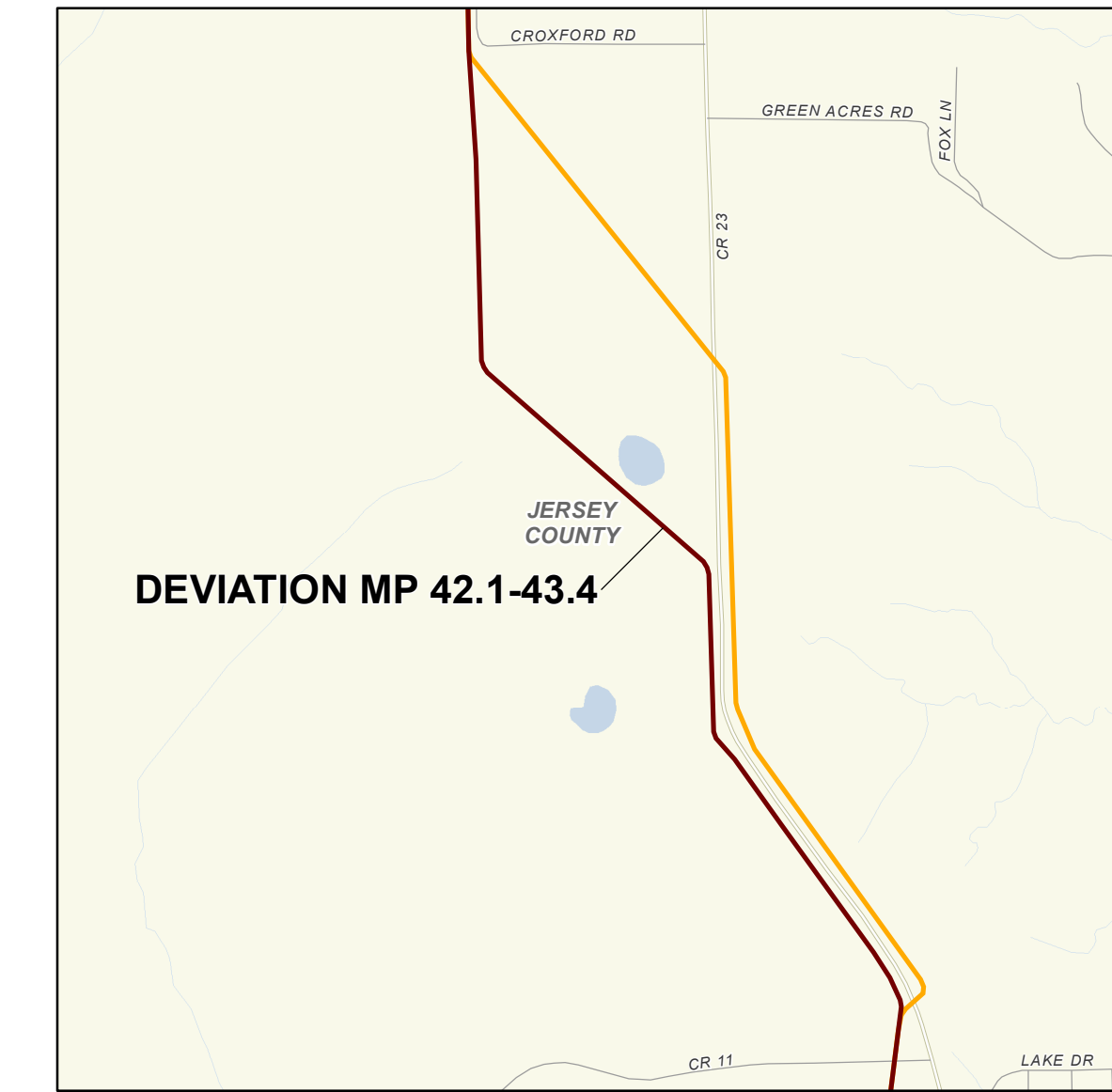
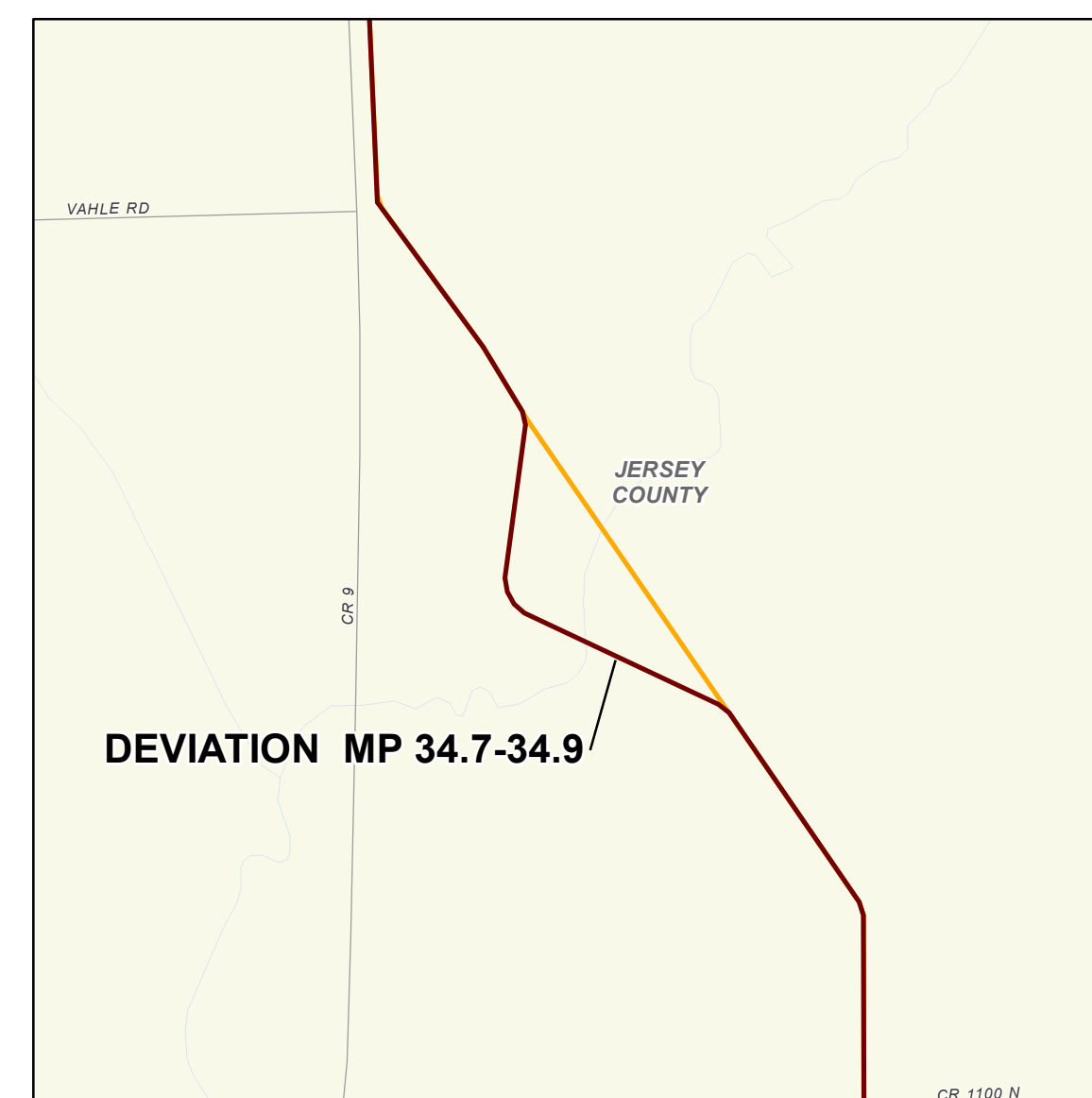
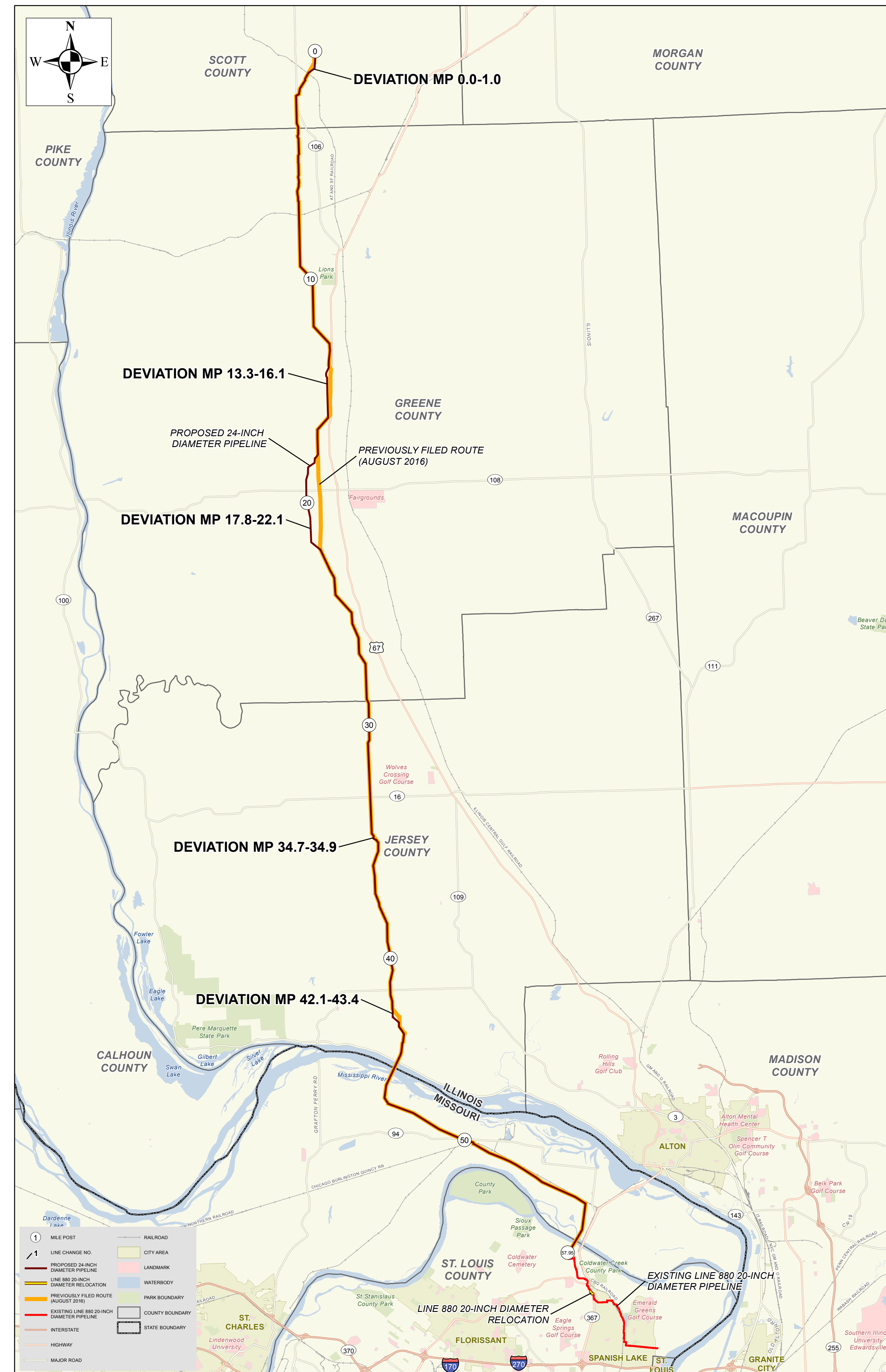
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APPENDIX 10-C
Minor Route Deviation Maps

SPIRE STL PIPELINE PROJECT

PROPOSED 24-INCH DIAMETER PIPELINE



Line Change No.	Oct. 2016 Filed FERC MI		Description	Alignment Sheets Impacted
	Begin MP	End MP		
DEVIATION 0.0-1.0	0.0	1.0	MAINLINE	STLP-A-001 STLP-A-002
DEVIATION 13.3-16.1	13.3	16.1	MAINLINE	STLP-A-015 STLP-A-016 STLP-A-017 STLP-A-018
DEVIATION 34.7-34.9	34.7	34.9	MAINLINE	STLP-A-038
DEVIATION 42.1-43.4	42.1	43.4	MAINLINE	STLP-A-046 STLP-A-047
DEVIATION 17.8-22.1	17.8	22.1	MAINLINE	STLP-A-020 STLP-A-021 STLP-A-022 STLP-A-023 STLP-A-024

**DRAFT FERC FILING
10/2016**

REFERENCE DRAWINGS				REVISIONS				APPROVALS				PREPARED BY Spire STL Pipeline	PREPARED BY M MOTT MACDONALD	SPIRE STL PIPELINE PROJECT 24" PROPOSED PIPELINE ROUTE DEVIATION OVERVIEW ILLINOIS & MISSOURI										
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	REVISIONS	DATE	DRAWN	CK	APPR	NO.	REVISIONS				DATE	DRAWN	CK	APPR	DRAWN BY	DATE	ENG. APPROVAL	DATE	CLIENT APPROVAL	DATE
												STLP-DEV-001												